QUANTIFICATION OF FREE AND CONJUGATED BISPHENOL A IN HUMAN FETAL LIVER TISSUE

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Background and Aims: The high production monomer, bisphenol A (BPA), is incorporated into polycarbonate plastic and epoxy resin for use in a variety of consumer products. Human biomonitoring studies of urine and serum BPA levels indicate continuous exposure that varies with age, race, gender, and diet. Animal studies have linked BPA to adverse health effects, ranging from reproductive to neuroendocrine dysfunction; however, the relevance of toxicological exposure levels to circulating human levels remains less characterized.
Methods: Here, we use high-performance liquid chromatography (HPLC) coupled with API 2000 electrospray triple-quadrupole mass spectrometer (ESI-MS/MS) to quantify BPA levels in fetal human liver tissue obtained from normal subjects from the University of Washington Laboratory of Developmental Biology (n=10).
Results: Total and free BPA were detected in 100% of the samples. Total BPA, a measure of free plus glucoronide conjugated BPA, ranged from 4.24 to 96.8 ng/g, with a mean value of 33.7 ng/g and a median value of 30.3 ng/g. Free BPA concentration ranged from 3.63 to 47.2 ng/g (mean: 22.4 ng/g and median: 21.3 ng/g). Fetal tissue samples exhibited a high ratio of free BPA to glucoronide conjugated BPA, ranging from 0.92 to 6.70, with a mean ratio of 3.48. Neither free, glucoronide conjugated, nor total BPA was associated with sex ($p>0.48$).
Conclusions: Our results suggest that the developing fetus may have reduced capacity to detoxify BPA. Quantification of internal doses of both free and conjugated BPA provides an opportunity to better understand the ontogeny of xenobiotic metabolism and its contribution to toxicity in sensitive populations. Furthermore, comparison of human tissue levels of BPA with levels measured in dosed laboratory animals will allow for more sophisticated interpretation of the relevance of toxicological studies.
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